

PATENT ABSTRACTS OF JAPAN

(11)Publication number : **10-085771**

(43)Date of publication of application : **07.04.1998**

(51)Int.Cl.

C02F 1/78

C02F 1/32

C02F 1/72

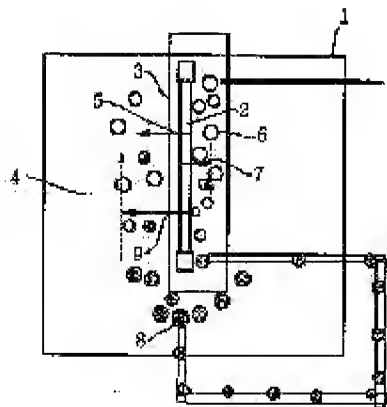
(21)Application number : **08-247639**

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(22)Date of filing : **19.09.1996**

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(54) METHOD AND APPARATUS FOR DECOLORING BARN DRAINAGE BY ULTRAVIOLET RAY



(57)Abstract:

PROBLEM TO BE SOLVED: To enable the prompt, simple decolorization of drainage by irradiating it with ultraviolet rays and aerating and decoloring it by using ultraviolet-excited ozone the oxidation efficiency of which is increased by the irradiation as an oxidizing agent.

SOLUTION: An ultraviolet electric discharge lamp 2 having a mercury emission spectrum of 185-254nm is arranged in a tank 1 which receives treatment water 4. The lamp 2 emits ultraviolet rays in the arrow 5 direction to decompose and decolor a polymer which is a coloring substance in a barn drainage 4. An outer tube 3 is arranged on the periphery of the lamp 2, and oxygen or air is injected between the lamp 2 and the outer tube 3, and the oxygen molecules 6 are converted into ozone 8 to be injected into the drainage 4. Active oxygen is released from the ozone 8, and the polymer in the drainage 4 is decomposed and decolored promptly. By this constitution, a decoloring percentage can be made to

reach about 60% in about 10hr and about 90% or more in about 15hr.

CLAIMS

[Claim(s)]

[Claim 1] It decolorizes by irradiating with ultraviolet rays to wastewater which should process wastewater from barns, such as a cow and a pig, in a method of carrying out complete treatment, And the decolorizing method by ultraviolet rays of a barn effluent decolorizing by carrying out aeration use into treated water by using ultraviolet excitation ozone as an oxidizer, and decolorizing by irradiating with ultraviolet rays to ultraviolet excitation ozone further, and raising oxidation efficiency as an oxidizer.

[Claim 2] During wastewater which should process wastewater from barns, such as a cow and a pig, in a device which carries out complete treatment, An ultraviolet-rays electric discharge lamp which has a mercury emission spectrum (185 nm and 254 nm), And an outer tube which often penetrates ultraviolet rays to a periphery of this ultraviolet-rays electric discharge lamp is made to allocate, A decoloring apparatus by ultraviolet rays of a barn effluent constituting so that may pour into a gap of this ultraviolet-rays electric discharge lamp and an outer tube air containing oxygen or oxygen, ozone may be excited by ultraviolet rays from this electric discharge lamp, and this ozone may be drawn into treated water and aeration may be efficiently carried out to the circumference of the above-mentioned outer tube.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention irradiates with and decolorizes ultraviolet rays to the livestock wastewater discharged from barns, such as a cow and a pig, and it generates ozone, carries out aeration use as an oxidizer, decolorizes, and relates to the decolorizing method by the ultraviolet rays of the barn effluent which carries out complete treatment efficiently, and its device.

[0002]

[Description of the Prior Art] In processing of the feces and urine discharged from barns, such as a cow and a pig, environmental pollution poses a problem. If livestock wastewater is discharged out of an agricultural system including high-concentration pollutants, without being purified, it pollutes the water quality of the downstream area remarkably, and it not only destroys natural ecosystem, but it may pollute it to people's sphere of life. Then, although various kinds of feces-and-urine **** methods are examined, the wastewater is assuming blackish brown and is promoting a feeling of contamination.

[0003] It is said that the blackish brown cause of a barn effluent originates in the humus in natural water. It is said that humus is the high molecular compound compounded by various kinds of biological and abiologlcal processes accompanying decomposition and humification of a plant body. The index showing the grade of this quality of coloration material is a "chromaticity", it is

called decolorization to fall a chromaticity, and various means are tried from the former, for example, there are coagulating sedimentation, an activated-charcoal-absorption method, a functional membrane method, the ozonizing method, an ultraviolet-rays oxidation style, etc. [0004]First, although coagulating sedimentation is a method of mixing, making the flocculating agent of an iron system and an aluminum system reacting to sewage, carrying out coagulation sedimentation of the coloring component, and obtaining only supernatant liquid, there is a fault that new processing called coagulation sedimentation thing processing increases.

[0005]Although it is a method by which a coloring component is adsorbed by activated carbon through sewage, the problem of exchange of activated carbon or the waste treatment of used activated carbon arises, and an activated-charcoal-absorption method is not practical, if the limit of the adsorption capacity of activated carbon is exceeded.

[0006]Although a functional membrane method is art which carries out filtration removal of the polymeric material which contains a coloring component by ultrafiltration membrane, a reverse osmotic membrane, etc., a film is expensive, it is easy to get it clogged with the case where it processes in a barn, and reprocessing of the condensed liquid is also needed, and this method is not practical, either.

[0007]Although it is a method which the ozonizing method generates high-concentration ozone with the ozonizer of a silent discharge system, is made to carry out aeration into sewage, and is decolorized by the oxidizing power of ozone, Since very high-concentration ozone is needed, high concentration ozone has economically a fault for which new ozonization is needed in processing of a high chromaticity like a barn effluent.

[0008]Furthermore, with an ultraviolet-rays oxidation style, ultraviolet rays and an oxidizer are used together, the substance in which oxidizing power is higher than ozone is generated, it is the method of carrying out oxidation decolorization, and refractory organic substances can also be disassembled. Although new waste treatment is also unnecessary, and a device also becomes compact and is an effective method, it becomes a burden economically to add an oxidizer and a maintenance top also has a problem.

[0009]

[Problem(s) to be Solved by the Invention]There is a fault that many above-mentioned methods need secondary processing economically [neither] although there is the decolorization effect of a barn effluent, respectively. This invention removes the above faults and an object of this invention is to provide the device of decoloring method ***** of a barn effluent quick, economical, and simple.

[0010]

[The means for solving an invention] In the way this invention carries out complete treatment of the wastewater from barns, such as A. cow and a pig, in order to attain the above-mentioned purpose, It is characterized by having decolorized by having irradiated with ultraviolet rays to the wastewater which should be processed, and having decolorized by carrying out aeration use into treated water by using ultraviolet excitation ozone as an oxidizer, irradiating with ultraviolet rays to ultraviolet excitation ozone further, raising the oxidation efficiency as an oxidizer, and decolorizing.

[0011]B. During the wastewater which should process the wastewater from barns, such as a cow and a pig, in the device which carries out complete treatment, The ultraviolet-rays electric discharge lamp which has a mercury emission spectrum (185 nm and 254 nm), And the outer tube which often penetrates ultraviolet rays to the periphery of this ultraviolet-rays electric discharge lamp is made to allocate, The air containing oxygen or oxygen is poured into the gap

of this ultraviolet-rays electric discharge lamp and an outer tube, ozone is excited by the ultraviolet rays from this electric discharge lamp, and this ozone is drawn into treated water, and it is characterized by constituting so that aeration may be efficiently carried out to the circumference of the above-mentioned outer tube.

[0012]

[Function]By an above-mentioned means and composition, this invention performs the following operations.

** . It is decomposed and decolorization of high molecular compounds, such as humin which is quality of coloration material in a barn effluent, is attained. The ultraviolet rays (185nm and 254 nm) emitted from an ultraviolet-rays electric discharge lamp disassemble a high molecular compound. And similarly, 185-nm ultraviolet rays excite oxygen or the oxygen supplied in the air, and generate ozone. These ozone is collected, aeration is further carried out into treated water, natural decomposition of this ozone by which aeration was carried out is carried out, active oxygen is generated, and active oxygen starts the above-mentioned high molecular compound and oxidative degradation, and promotes a decolorization reaction.

[0013]The 254-nm ultraviolet rays emitted to the ozone by which aeration was carried out from an ultraviolet-rays electric discharge lamp decompose ozone quickly, generate active oxygen at a high speed more, and promote a decolorization reaction further.

[0014]Therefore, a decolorization reaction is advanced with accuracy sufficient [decolorization] at high speed by the decomposition effect which the oxidative degradation by decomposition by ultraviolet rays, the oxidative degradation of ozone, and decomposition of ozone by ultraviolet rays made pile up mutually.

[0015]

[Embodiment of the Invention]Hereafter, one embodiment of this invention is concretely described based on an attached drawing. In Drawing 1, 1 is a tank which performs ***** and the treating solution (barn effluent) 4 which should be processed is accommodated. In that tank 1, the ultraviolet-rays electric discharge lamp 2 which has a mercury emission spectrum (185 nm and 254 nm) is allocated, and the outer tube 3 which consists of the high purity quartz glass, the synthetic quartz glass, and the plastics etc. which often penetrate ultraviolet rays on the periphery of this ultraviolet-rays electric discharge lamp 2 is located.

[0016]And as the arrow 5 shows the ultraviolet rays (185 nm and 254 nm) emitted from the ultraviolet-rays electric discharge lamp 2, it glares through the outer tube 3 to the high molecular compound which is quality of coloration material in the barn effluent 4, and a high molecular compound is disassembled and decolorized.

[0017]The air containing oxygen or oxygen is poured into the gap of the ultraviolet-rays electric discharge lamp 2 and the outer tube 3. And the oxygen molecule shown with a circle [of 6 / white] is excited by the 185-nm ultraviolet rays emitted from the ultraviolet-rays electric discharge lamp 2 as the arrow of 7 shows, and it is changed into the ozone 8 shown by the black dot. This ozone 8 is drawn into the treated waste water 4. This ozone 8 is again poured in into treated water from the lower part of the barn effluent 4, and it is things, and a part of those ozone 8 emits active oxygen by natural decomposition, and it carries out oxidative degradation of the high molecular compound in the treated water 4.

[0018]It is decomposed at high speed by the 254-nm ultraviolet rays 9 emitted from the ultraviolet-rays electric discharge lamp 2 again, and the remainder of the ozone 8 in the treated water 4 is decomposed into active oxygen and oxygen. This active oxygen carries out oxidative degradation of the high molecular compound in the treated water 4, and decolorization is

performed quickly.

[0019]In drawing 2, 10 has passed through the neighborhood of the outer tube 3 in the time of passing the ozone 8 of a black dot to the position which is separated from the ultraviolet-rays electric discharge lamp 2 and the outer tube 3. When it passes through the neighborhood 11 of the outer tube 3, although radiation of the 254-nm ultraviolet rays from the ultraviolet-rays electric discharge lamp 2 is received well, since ultraviolet rays do not reach, as for the ozone 8, the ozone 8 in the position 10 which is separated from the outer tube 3 hardly receives 254-nm radiation. Therefore, the quantity of the active oxygen generated by decomposition of the ozone 8 decreases with ** which separates from the outer tube 3, and the decolorization effect decreases.

[0020]In this invention, since ultraviolet radiation is well received in order to make the collected ozone 8 flow near the outer tube 3 by the method shown in Drawing 1, and decomposition of the ozone 8, and generating of active oxygen and disassembly of a high molecular compound are performed efficiently, more effective decolorization can be performed. If the ultraviolet-rays electric discharge lamp 2 is an ultraviolet-rays electric discharge lamp which carries out luminescence containing mercury emission spectra (185 nm and 254 nm), such as a low pressure mercury lamp, a high-pressure mercury-vapor lamp, or a metal halide lamp, it cannot be overemphasized that the same effect is acquired.

[0021]

[Example]Putting in 20 l. of urine sewage of the pig of the chromaticity 400 in the tank 1, the used ultraviolet-rays electric discharge lamp 2 is a 15-W low-pressure mercury lamp. 50 ppm of hydrogen peroxide as an oxidizer was poured in. Ozone poured in the thing of the 200 ppm concentration generated by ozoner ISA.

[0022]ozone -- if independent, 10 hours passed, the decolorization rate was about 15%, also eventually 20% was a limit, and 40% was a limit, even if a decolorization rate is about 30% and it continued also by the ultraviolet-rays oxidation method in 10 hours. However, in the method by this invention, the decolorization rate was close to 60%, the decolorization rate of not less than 90% was obtained, and the practical thing was proved in 15 hours.

[0023]The graph of each change with time of the decolorization rate B in the ultraviolet-rays oxidation method which used the decolorization rate A by this invention and hydrogen peroxide as the oxidizer, and the ozone independent decolorization rate C is shown in drawing 3. It turns out that the decolorization rate A by this invention is far excellent also in this graph compared with the method of decolorizing other two methods so that clearly.

[0024]

[Effect of the Invention]Since according to the decolorizing method by the ultraviolet rays of the barn effluent of this invention, and its device decolorize the blackish brown wastewater from barns, such as a cow and a pig, a feeling of contamination of wastewater is lost, various pollutants are also purified and it is discharged out of an agricultural system, as explained above, There is no contamination of the water quality of the downstream area, natural ecosystem is maintained, and not foolish ** but people's sphere of life is maintained. Since there is not only the decolorization effect of a barn effluent but strong oxidizing power, there is also a bactericidal effect, and effects, such as reduction of COD and BOD and reduction of an offensive odor, can also be expected.

[0025]A sediment like a conventional system, etc. are not produced, secondary processing becomes unnecessary, and the economical effect is also high.

[0026]When ozone remains superfluously, it may invade a latter pipe fitting, but in this

invention, by ultraviolet rays, is understanding by high-speed about ozone, and does not need a troublesome ozonization process.

[Translation done.]

TECHNICAL FIELD

[Field of the Invention]This invention irradiates with and decolorizes ultraviolet rays to the livestock wastewater discharged from barns, such as a cow and a pig, and it generates ozone, carries out aeration use as an oxidizer, decolorizes, and relates to the decolorizing method by the ultraviolet rays of the barn effluent which carries out complete treatment efficiently, and its device.

[Translation done.]

PRIOR ART

[Description of the Prior Art]In processing of the feces and urine discharged from barns, such as a cow and a pig, environmental pollution poses a problem. If livestock wastewater is discharged out of an agricultural system including high-concentration pollutants, without being purified, it pollutes the water quality of the downstream area remarkably, and it not only destroys natural ecosystem, but it may pollute it to people's sphere of life. Then, although various kinds of feces-and-urine ***** methods are examined, the wastewater is assuming blackish brown and is promoting a feeling of contamination.

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MEANS

[A means for solving an invention] In a way this invention carries out complete treatment of the wastewater from barns, such as A. cow and a pig, in order to attain the above-mentioned purpose, It is characterized by having decolorized by having irradiated with ultraviolet rays to wastewater which should be processed, and having decolorized by carrying out aeration use into treated water by using ultraviolet excitation ozone as an oxidizer, irradiating with ultraviolet rays to ultraviolet excitation ozone further, raising oxidation efficiency as an oxidizer, and decolorizing.

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OPERATION

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EXAMPLE

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[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]It is an outline side view of the decoloring apparatus by the ultraviolet rays of the barn effluent by this invention.

[Drawing 2]It is an outline side view of the operating state.

[Drawing 3]It is the graph which compared the decolorization rate with the decolorization rate by this invention with other decoloring methods.

[Description of Notations]

1 The tank in which a barn effluent is accommodated

2 185 nm, the ultraviolet-rays electric discharge lamp which emits a 254nmk mercury emission

spectrum

3 The outer tube which penetrates ultraviolet rays

4 ***** of a barn effluent

5 Ultraviolet rays emitted from the ultraviolet-rays electric discharge lamp (185nm and 254 nm)

6 Oxygen molecule

7 185nm ultraviolet rays emitted from the ultraviolet-rays electric discharge lamp

8 Ozone

9 254-nm ultraviolet rays emitted from the ultraviolet-rays electric discharge lamp

10 The state where ozone was passed to the position which is separated from an outer tube

11 The state in which ozone passed through the neighborhood of an outer tube

Change of the decolorization rate by A this invention

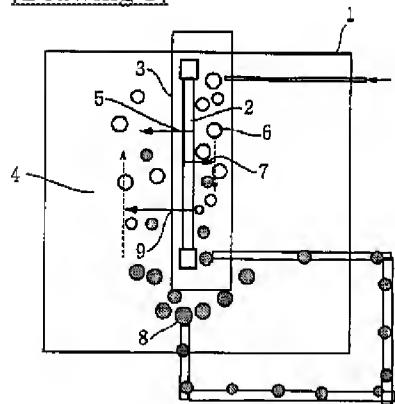
Change of the decolorization rate in the ultraviolet-rays oxidation method which used B hydrogen peroxide as the oxidizer

C Change of an ozone independent decolorization rate

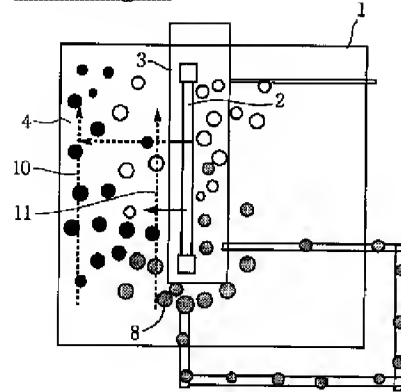
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DRAWINGS

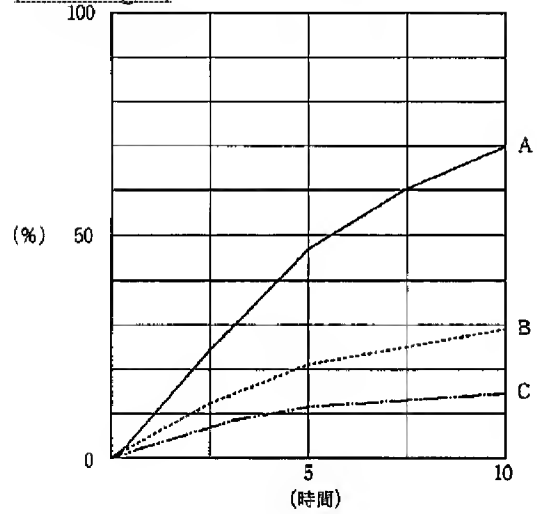
[Drawing 1]



[Drawing 2]



[Drawing 3]



A: 本発明による脱色率

B: 過酸化水素を酸化剤とした紫外線酸化方式での脱色率

C: オゾン単独での脱色率の変化

[Translation done.]